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Final Essay for Animals, Architecture and Aesthetics

Mass Ballooning: Spider's Perseverance and Insight to Future Human Architecture and Civilization

"The fact that it didn't separate - it was like these spiders had coordinated to make this incredible landscape art installation or something," [1]

Introduction:

Ballooning is an ability possessed by spiders commonly used to disperse long distances for both colonization purposes[2] and for what will be described in depth later as means of communal survival during times of ecological pressure. Spiders have existed on earth for around 400 million years however when they began to balloon is unknown. Scientific interest in this phenomenon can be traced to around 1832 when Charles Darwin while on his ship the HMS Beagle reported witnessing hundreds of spiders floating and landing upon the ship, he claimed in order for this to be possible they must have flown at least sixty miles off-shore[3]. In general ballooning has been witnessed amongst adolescent spiders. Upon hatching these adolescent spiders will feed on undeveloped eggs and interestingly avoid partaking in cannibalism. These spiders will then form a communal web and within a week all the adolescent spiders will have left the communal web by means of ballooning[4]. Pregnant female spiders are also noted to balloon often as means of colonization; In a study taken in Namibia it was found that the vast majority of ballooning spiders were female and upon capture of nine spiders, seven produced

[1] BBC, *Spider-webs blanket Australian landscape after floods*, 5
[2] Schneider et al, *They do Balloon After All!*, 115
[3] Sample, *Research sheds light on how spiders 'take flight'*, 1-2
[4] Valerio, *Population Structure in the Spider, 185*

egg-sacs soon after. Indicating that ballooning to be a means of colonization as it is believed this is responsible for the existence of spiders on many remote islands[5][6].

Sheet webs, also known as gossamer webs, are essentially the bi-product produced by the action of ballooning. It is thought however that these circuits of webs can be made with intention similar to traditional orb webs. However gossamer webs are inherently less deliberate and meticulous in their creation. It was observed during the study in Namibia upon taking flight at times the threads utilized for ballooning could get accidentally attached to the branches of trees; it is also known that the spiders will cast new strands of silk to attach to objects if they wish to end their flight[7]. Ballooning can be utilized by spiders to both travel long distances quickly and to create sheet-like webs which can drape over objects of the environment around them. These webs can be strategic for the spiders in times of flood when the ground is no longer a safe and viable place of existence.

Main Essay:

It is important to understand that in essence as long as a spider can shoot silk it is capable of ballooning or at least attempting the action, with this in mind it is much more common for both adolescent spiders and spiders of smaller size to balloon. This is due to various reasons along the ballooning process. In order to balloon a spider must climb to high vantage points; tree branches, sign posts, etc. It then begins tip-toeing, a kind of wind up, before it casts what's reported to be three to four threads each between 3-4m long. The spider is then lifted by these threads into the air[8] in which they can flow along wind paths. Larger spiders are regularly deterred from partaking in this as the process of climbing to these heights for it is more

[5] Schneider et al, *They do Balloon After All!*, 115
[6] Suter, *The Physics of Ballooning in a Chaotic Atmosphere*, 283
[7] Suter, *The Physics of Ballooning in a Chaotic Atmosphere*, 283
[8] Schneider et al, *They do Balloon After All!*, 115

physically taxing in comparison to that of smaller spiders. The process is also more dangerous for larger spiders as it puts them at greater visibility and in turn vulnerability to predators, this is combined with their mass not being ideal in aiding their silks ability to lift them; it was viewed by researchers Wickler and Seibt in 1986 that spiders between 80-150 mg in size could not be lifted. Because of this size restriction the spiders most commonly witnessed ballooning are those belonging to either the adolescent age or the Linyphiidae taxa, which is a general taxa of spiders of a smaller size that can balloon during both adolescence and adulthood[9]. Linyphiidae are also the most common ballooning spiders in New South Wales, Australia[10], our area of focus.

Though much of the scientists around the topic of ballooning are interested in the process where spiders travel long distances and how they utilize wind patterns, and more interestingly of a recent 2018 discovery naturally occurring electric fields that react with their silk to assist with flight[11]. The general public is instead greatly affected and at awe of the by-product created from ballooning as massive sheet webs draped across the South Wales countryside, ranging across trees, farmland, signs and practically the entire landscape. These events have become so prominent that Australia is recognized for having a 'spider season' which also happens to coincide with times where the continent experiences heavy rain and flooding[12]. This gives us the basis to believe that spiders may not only partake in ballooning as means of colonization but also as means of dispersion when under environmental pressure. Making it also a survival tactic employed during times of crisis. This claim is supported by studies done as it

[9] Schneider et al, *They do Balloon After All!*, 115
[10] Suter, *The Physics of Ballooning in a Chaotic Atmosphere*, 282
[11] Morley, *Electric Fields Elicit Ballooning in Spiders*
[12] Cokinos, *Raining Spiders*, 5-6

was discovered in 1970 then again in a 1982 study which found: “wolf spiders that had evolved under conditions of habitat abundance and predictability… were less disposed to aerial dispersal”[13]. Upon understanding that spiders also evolved to practice ballooning as a survival mechanism, we can acknowledge that spiders of the adolescent and smaller size could use this function to effectively flee areas of flood to move to higher ground; but we also have basis to believe that larger spiders that couldn’t traditionally balloon may participate in order to create webs on objects above water levels on trees signs bushes etc in order to survive. This claim is supported by imagery following floods of both webs draped in areas of flood and in areas away.

On the topic of a 2021 mass ballooning event the senior insect curator for the Museums Victoria stated “Ground-dwelling spiders need to get off the ground very quickly. The silk snakes up and catches onto vegetation and they can escape,”[14]. In a sense the gossamer webs created from ballooning could be seen as a form of disaster architecture by spiders with not necessarily an interest in aesthetics but rather practicality and most of all, efficiency. Another interesting aspect surrounding these creations is it seems to be a collaborative effort amongst the spiders. Arachnids are known to be quite solitary individualistic creatures not preferring to live socially amongst each other, with only around 25 of 40,000 known species being considered social[15]. When studying the social lives of spiders we are aware that adolescent spiders in their first instar

[13] Suter, *The Physics of Ballooning in a Chaotic Atmosphere*, 282

[14] BBC, *Spider-webs blanket Australian landscape after floods*, 1
[15] Oxford Press, *Untangling the social lives of spider*, 1

are known to live together in a communal webs before they disperse and carry on separate lives constructing their own webs and living alone. However interestingly the threat of flood eradicates these behaviors as these spiders in time of crisis retort to their adolescent behavior once again building a communal web. The spider's regular behavior is likely shifted to this more social form as they recognize under such life threatening situations their likelihood of survival is increased if they work together rather than separate.

Amidst the mass ballooning event which took place in 2021 in New South Wales, there were large amounts of media interest surrounding the phenomenon, with an interviewed local claiming "I've seen it before, but nothing as much as this… it was absolutely stunning"[16]. The media interest in this particular instance is likely due to its grandiose scale, yet mass ballooning has been on record occurring all over the world. In places from Ireland to Tennessee to Pakistan however through extensive research the earliest writings about these events came in 1998 when researcher Crouch wrote describing a mass dispersal event[17]. It should be noted that this was almost certainly not the first ever mass ballooning event, but it is interesting to note that news revolving around these spectacles didn't begin until the 21st century. Giving basis to believe further that these events are evolutionary reactions towards flooding and climate change. Spiders aren't the only animals beginning evolutionary changes towards furthered unforeseen circumstances as this has also been noticed in other animals such as birds, various fish and bugs[18]. However spiders become uniquely interesting as their evolutionary change is bringing a shift in how they interact socially and not only how, but what they construct. Through architecture and social change this makes the spider's evolution specifically relevant to humans and human behavior.

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[16] BBC, *Spider-webs blanket Australian landscape after floods*, 2
[17] Schneider et al, *They do Balloon After All!*, 114
[18] Thompson, *Ten Species Evolving Due to Climate Change*

As stated previously, we understand that in general spiders are quite isolated creatures which do not choose unless forced by external conditions to live amongst each other. Though humans do not live this way, hence being quite literally the opposite instead choosing to live amongst each other in cities, neighborhoods, civilization. The spiders' change in social behavior however could be an indicator of economic change humans may be forced to make in-order to survive. As promises by worldwide nations following the 2016 Paris Agreement have evidently failed to materialize, it is more than likely that humans will experience disastrous environmental conditions[19] that will not only force changes amongst spiders, but eventually humans as well. Imagining spiders' social activity in the context of economics it is apparent they would fall under anarchism widely possessing libertarian beliefs, as they prefer a lifestyle of self sufficiency without aiding, assisting or even interacting with one another for any reason aside from reproductive purposes. In an essay published amidst the market crash in 2008, Jeffery Frankel of Harvard University famously wrote "They say there are no atheists in foxholes. Perhaps, then, there are also no libertarians in financial crises" [20] in reference to mass bailouts being performed by a conservative Bush administration which harshly criticized the previous Clinton administration for quite literally performing the exact same thing. Just as conservatives lost their libertarian beliefs during the economic crisis, so do spiders when faced with an environmental crisis. We see both species, humans and spiders alike lose much of their conservative beliefs in these times and instead lean towards more left leaning policy and social behavior whether it be government bailouts on the human's side or the creation of communal gossamer webs on the spiders part. Both species are seen to take a 'humane' driven approach to encourage the survival of as many of their peers as possible, rather than functioning on greed or taking an isolationist

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[19] Vox, *The tricky plan to pull CO2 out of the air*, 3:00
[20] Frankel, "*No Atheists in Foxholes?" No Libertarians in Financial Crisis*, 1

approach as we both recognize what's in the best interest of the masses is also in the best interest of the personal. As taking losses in the forms of businesses going under would be of great loss to the American economy just as spiders taking great losses to their population would be harmful to their further existence. When understanding how both humans and spiders naturally respond, it is not hard if anything it is likely to theorize and predict worldwide influx of left leaning economic beliefs as under ecological pressure society may be forced to lean on humanity rather than greed and accelerated gain. Now whether this points to humans being prone to operating under a marxist utopia, I believe is impossible to predict. I think it is fair to say society will have to move towards that direction in order to prolong its existence. The United States is currently an extremely right leaning nation when it comes to economic policy as we have a conservative base of reference for economics, where the Republican party in actuality represents far-right economic beliefs with the Democratic party simply representing the right. With, of the two main parties in the US, neither side actively or accurately represents the left. This was proven in 2016 when self proclaimed socialist yet by definition capitalist presidential candidate Bernie Sanders whose beliefs fall under those of social democrat, was seen as a radical amongst the American public and its politicians as he was even highly contested and challenged by liberal media which is generally meant to uplift thinkers on the left, despite him realistically by means of the economic scale being a centrist. Because of America’s right-wing base I believe the economic shift for the US will likely fall under the realm of a Social Democracy and at most towards revisionist Marxism, however unlikely. This will allow society to uphold much of its citizens keeping much of the population afloat while still allowing humans to participate in fundamental human behavior by practicing in classism and greed just with less disparity between classes as seen today. In a complete world view we’ll see all governments, not just the US's, make this leftward

shift likely putting already left leaning nations such as many in Northern Europe which Sanders idolizes in a better position to protect its citizens from damage as result of global ecological disaster. Alast in reference to the spiders once the flooding is over they disperse from these webs and return back to their regular lifestyle[21]. So in the case we somehow reverse climate change and restore the earth to a healthy state it is likely we'll also return to our hyper-capitalist state and likely as a result re-pollute the earth.

Another inference we can make about the future civilizations from the spiders is if the webs will inform us on future architectural design. Understanding the social change humans will take on this will likely have a strong influence on the themes and styles of architecture that will emerge just as we see with the sprawling draped gossamer webs as opposed to standard small scale cobwebs and such. Though there will be obvious structural changes made to better suit functionality and needs for protection, I find it quite interesting that aesthetically humans may as well follow the suite of spiders and our structures may take large stylistic inspiration from these gossamer webs. Studying these mass webs aesthetic qualities it became apparent that it reminded me heavily of the later works of modern artist Jackson Pollock who is widely famous for his 'drip paintings'. These paintings precisely are what reminded me of these webs and in actuality they have many similarities not only aesthetically but also how they're constructed. Pollock's drip painting created vast webs of layers and different layers it was all done at random however

still conveyed his artistic vision, he did this by quite literally dripping paint along the canvas at random [22]This is the exact way spiders create

[21] Harvey, *Thousands Of 'Ballooning Spiders Cloak Australian Town in Webs*, 1
[22] Wayne Arthur, *Why Did Jackson Pollock Do Splatter Paint*

gossamer webs: they shoot silk into the air at random in which it then gets caught and snagged by the trees, bushes and whichever other objects surround them. Just like Pollock the spiders are in no means intentional with their creation, they instead just simply create, the two pieces are made in the exact same manner. However both Pollock and the spiders didn't always create their respective crafts in this way. Pollock before shifting to the abstract expressionism he so famously pioneered in fact painted in a popular regionalist style where he did in fact utilize technical painting skills to depict admittedly stylistic yet still in a way realistic depictions of humans and

scenery. What caused the shift in style was the devastation caused by the second world war. In fact during the war regionalism seemed to disappear in total, as its power was completely deflated once Americans left to fight overseas. The segway from regionalism to abstract expressionism was ushered in by the war, it was along with other aspects an expression of trauma as the world was left to recover following two indescribably deadly world wars just in the beginning half of the twentieth century. The style of abstract expressionism certainly seeps into the overarching aesthetic of the gossamer webs which aren't stylistically inspired by trauma but rather as a defense mechanism to withstand. This could be why intellectually we are prone to creating in this style in response to trauma, as it is done similarly in the natural world. Making for a good inferance that new post-disaster styles of architecture will emerge drawing comparison to both Pollock and the gossamer webs.

It should be stated that buildings likely will not be built using the methods of Pollock and the spiders, as unlike any other art form architecture has a unique obligation to functionality. I do believe however the functionality of the gossamer webs will deeply inform future architecture.

The gossamer webs have three main attributes that make them ideal; the first being they are elevated, they give spiders the opportunity to emerge from their homes on the ground level to higher places in order to avoid flooding[23]I believe this will be a crucial need in future architecture as flat lands may become as unreliable for humans as they've become for spiders. The second being they are communal and can provide for entire populations, as discussed previously society will have a need to shift towards a more left leaning economic system in order to sustain itself, so it is not hard to imagine the concept of personal property being eradicated by necessity and instead witness masses live together in shared inclusive structures. The final attribute is for the structures to be built quickly and with ease, how the spiders do this is by shooting the webs at random, however this cannot be done for humans, instead I take it that humans will expedite the construction process instead by using local materials that can be harvested on spot instead of importing which can cause delays and confusion, we will also look to build upon rather than destroy our natural landscape, using natural structures as aid for buildings rather than something hindering construction. This is seen by the spiders using trees, bushes and signs to aid them in gaining height above the ground, humans will likely look to build structures out of mountain scapes and other elevated areas. I do not know exactly what buildings of the future will look like but as proven it makes sense they'd take from the gossamer webs both aesthetically and functionally, I personally have ideas for the future design styles that may arise however this is up to architects of the future to design and create.

Through this essay I hope I was able to demonstrate the thought process behind our arachnid friends' actions in response to climate change, and was able to demonstrate the inherent social and psychological similarities between arachnids and us, humans. All living things share a common goal, to survive, making us not that much different from any other animal. Spiders in

[23] Harvey, *Thousands Of 'Ballooning Spiders Cloak Australian Town in Webs*, 1

their small mass compared to humans are experiencing the damages of climate change at an accelerated rate. It is likely to assume that the experience of arachnids now, could be similar to what humans will experience in a hundred or so years, this is why we can look to the spider's reaction as insight to how we may be forced to exist in coming years. A powerful statement I felt that came from Jeffery Frankel in his 2008 post is "There are no atheists in foxholes,' it is not an argument against atheism — it is an argument against foxholes"[24]. I by no means believe that this is an ideal future as instead this essay is more interested in predicting what will happen if humans choose not to attack the climate crisis, and heal our planet. This doesn't have to be the reality for future civilization, and in fact I hope it isn't, I hope the second half of this essay ages to be completely incorrect, yet unfortunately we're running out of time and if radical measure is not taken soon I fear I will be completely correct on all counts; and spider behavior in the early 21st century will have accurately foreshadowed the future of human architecture and civilization.

[24] Frankel, "*No Atheists in Foxholes?" No Libertarians in Financial Crisis*, 5

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